ELEKTRODA SELEKTIF ION BROMIDA DENGAN MEMBRAN PADAT CAMPURAN AgBr, GRAFIT DAN PARAFIN CAIR

Oleh:

Fatmi Sumiati
J2C 003 128

RINGKASAN

Pengukuran kadar ion bromida banyak dilakukan untuk keperluan analisis laboratorium, pengendalian lingkungan dan keperluan industri. Pengembangan metode analisis ion bromida dilakukan untuk mengembangkan metode alternatif yang memiliki kelebihan dibandingkan dengan metode analisis yang lain. Elektroda selektif ion (ESI) merupakan metode alternatif yang banyak dikembangkan karena alasan praktis, cepat, dan akurat dalam analisis. Penelitian ini bertujuan membuat elektroda selektif ion bromida dengan membran padat berupa campuran AgBr, grafit, parafin cair serta mempelajari karakteristiknya.

Membran elektroda selektif ion dibuat dengan beberapa variasi komposisi (penentuan komposisi optimum), kemudian dirangkai pada kawat tembaga dan dilakukan karakterisasi untuk mengetahui nilai faktor Nernst, koefisien selektivitas, limit deteksi, serta waktu respon. Karakterisasi dilakukan pada kondisi larutan netral (pH=7), dan temperatur kamar.

Komposisi elektroda selektif ion bromida yang optimum diperoleh dari perbandingan AgBr, grafit, parafin cair berturut-turut adalah 65 : 25 : 10 (m/m). Hasil karakterisasi dari ESI bromida adalah nilai faktor Nernst -50,34 mV/dekade, range deteksi 1,36 10^{-5} – 10^{-1} M, waktu respon elektroda ≅ 15 detik, sedangkan urutan koefisien selektivitas adalah $Cl^- > I^- > NO_3^- > SCN^- > C_2O_4^{2--}$.

SUMMARY

Determination of bromide ion is usually carried out for the purpose of laboratory analysis, environmental control and industrial process. The development of the analysis method is needed to find out a new alternative method which has more advantage and better performance than the previous methods available. Ion selective electrode is an alternative way which is developed recently for reason of its practice, rapid and accurate in analysis. The objectives of this research were to produce bromide ion selective electrode with the mixture of AgBr, graphite and liquid paraffin as the solid membrane, and to study its characteristics.

Ion selective electrode membrane was made in variable composition (to find out the optimum composition) and was connected to a copper wire. It was then characterized to find out Nernstian factor value, coefficient of selectivity, detection limit and response time of the electrode. The characterization was carried out in neutral condition (pH=7) and at room temperature.

The most effective ion selective electrode was obtained when the composition of AgBr, graphite and liquid paraffin was made in ratio of 65: 25: 10 (m/m) respectively. From the characterization, the Nernst factor value, detection range and the response time of bromide ISE produced were -50.34 mV/decade; 1.36 10^{-5} – 10^{-1} M and ≅ 15 seconds respectively. Meanwhile, the coefficient of selectivity of the electrode followed the order of $Cl^- > I^- > NO_3^- > SCN^- > C_2O_4^{2-}$.

DAFTAR PUSTAKA

Abbas, M.N.E., 2003, *Chemically Modified Carbon Paste Electrode for Iodide Determination on the Basis of Cethyltrimethilammonium Iodide Ion-Pair*, Analytical Sciences Vol. 19, p. 229-233, The Japan Society for Analitycal Chemistry, Japan.

Adam, N., Chunlong Z., & J. Gandhi, 2006, *Determination of Trace Level Bromate and Bromide in Drinking Water by Suppressed Conductivity and Mass Spectrometry*, Metrohm-Peak, Inc. Houston.

Atikah, 1994, *Pembuatan dan Karakterisasi ESI Nitrat Tipe Kawat Terlapis*. Tesis Pasca Sarjana, ITB Bandung.

Attiyat, A.S., Christian, G.O, Hallman, J.L., Barstch, R.A., 1988, *A Comparative Study of The Effect o-Nitrophenyl Octhyl Ether and o-Nitrophenylpenthyl Ether as Plasticizer on The Respon and Selectivity of Carrier – Based Liquid Membran Ion Selective Electrode*, Talanta, 35, pp. 789-794.

Bailey L. P., 1983, *Analysis With Ion-Seletive Electrodes*, Heyden & Son Ltd., London.

Bakker, Eric, 2004, *Electrochemical Sensors*, Analitycal Chemistry, Vol. 76, No.12, pp. 3285-3298

Buchari, Wahab A.B., Ambo U., & Jalalludin M.N., 2005, *Pengaruh Komposisi Membran Berpendukung PVC Terhadap Kinerja Elektroda Selektif Ion Hg (II) Menggunakan Ionofor DBA218C6*, Departemen Kimia ITB, Bandung.

Buck R.P., dan Lindner E., 1994, *Recommendation for Nomenclature of Ion Selective Electrodes*, Pure and Application Chemistry, Vol. 66 No.12, pp. 2527-2536

Evans, A., 1991, *Potentiometry and Ion Selective Electrodes*, John Wiley & Sons., New York, p. 105-116.

Frant, S. M., 1940, *Where Did Ion Selective Electrodes Come From?*, Journal of Chemical Education, Vol. 72 (2), p. 159-166.

Hapsari, A. 2006, *Pembuatan dan Karakterisasi Elektroda Selektif Ion Iodida Menggunakan Campuran AgI, Grafit dan Parafin Cair*, Skripsi Universitas Diponegoro, Semarang.

Harvey, D., 2000, *Modern Analytical Chemistry*, DePauw University, McGraw-Hill Comp., North America, pp. 462-483.

Maskyur, A., Wahyuningsih, S., dan Prasety, H., 2004, *Pembuatan dan Karakterisasi Elektroda Selektif Ion Tembaga Menggunakan Campuran CuS, Parafin dan Grafit*, Al Chemy Vol. 3 No. 6.

McGraw-Hill, 2003, *Dictionary of Chemistry*, Second Edition, New York, p. 195

Meyerhoff, M. E, Opdycke, W.N, 1986, *Ion Selective Electrodes; Advances in Clinical Chemistry*, Wadsworth Publishing, California, 50-76

Parker, S. P, 1993, *Encyclopedia of Chemistry*, Second Edition, McGraw-Hill, North America, p. 455-458.

Quinones, O., Shane A. S., 2005, *Analysis of bromate and bromine in blood*, Water Quality Research and Development Department, Southern Nevada Water Authority, USA.

Skoog, D. A., 1998, *Principles of Instrumental Analysis*, Saunder College Publishing, New York, pp. 584-585, 673-674.

Tarquin, A.J., Douglas D. R., and Rodolfo M. P., 2002, *Bromate Control During Ozonation of High-Bromide Drinking Water*, American Water Works Assosiation, El Paso

Vlack, V. L., 2004, *Elemen-elemen Ilmu dan Rekayasa Material*, Edisi Keenam, a.b. Ir. Sriati Djaprie,M.Met., Erlangga, Jakarta, Hal. 74-75.

Weiss, W.J., Bouwer, E.J., Ball, W.P., and O'Melia, C.R., 2003, *Study of Water Quality Improvements During Riverbank Filtration at Three Midwestern United States Drinking Water Utilities*, Geophysical Research, Vol. 5, 04297, USA

Wroblewski, W., 2004, *Ion-Selective Electrodes*, Analytical Chemistry, Vol. 80, No.15. pp. 658-660.

Zare, H.R., Memarzadeh, F., Gorji, A., Ardakani, M.M., 2005, *Iodide Selective Membran Electrode Based on Salophen Complex of Cobalt (III)*, J. Braz. Chem. Soc., Vol. 16, No. 3B, p.p. 571-577, Brazil.